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(54) **POLYGONAL ILLUMINATION REFLECTOR**

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(52) **U.S. Cl.** **359/855**; 359/856; 359/857; 359/858; 359/866
(58) **Field of Search** 359/855, 856, 359/857, 858, 866, 853; 362/296, 297, 298

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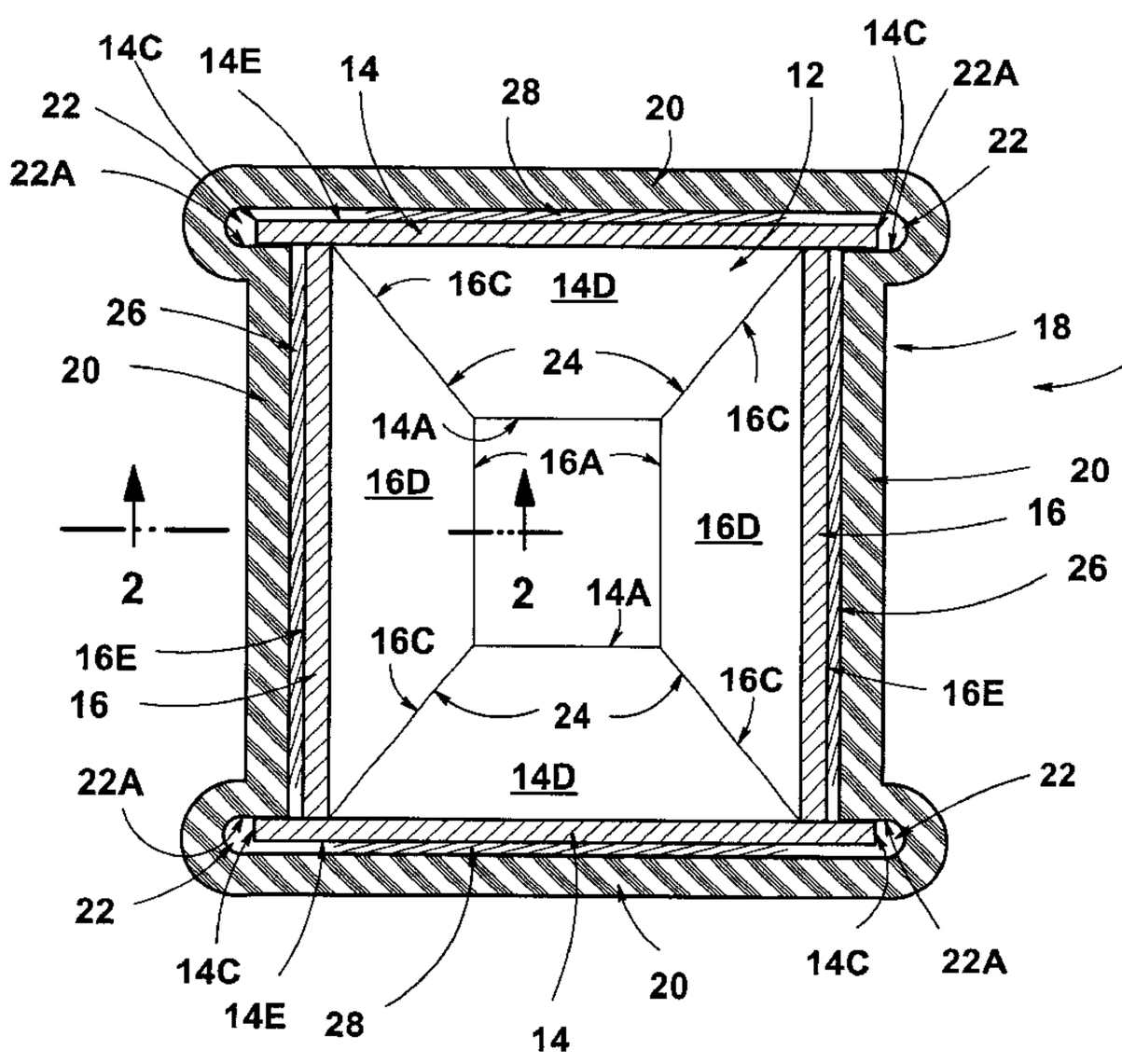
(57) **ABSTRACT**

A polygonal illumination reflector includes a support base and a configuration of discrete reflector elements supported by the support base. The reflector elements have respective pairs of opposite side edges and respective interior reflective surfaces. The reflector elements adjoin one another in providing the configuration. The support base has a plurality of adjacent side portions and a plurality of retaining pockets defined between and interconnecting the adjacent side portions to one another. The adjacent side portions of the support base correspond in number to the reflector elements. The retaining pockets are arranged in pairs wherein the retaining pockets of each pair are open in a facing relationship toward one another so as to receive therein and set in engagement therewith the opposite side edges of the reflector elements in a first sequence in the configuration. The reflector elements in a second sequence in the configuration are disposed between the reflector elements of the first sequence and supported by corresponding ones of the side portions of the support base such that the reflective surfaces of the reflector elements of the first sequence and the opposite side edges of the reflector elements of the second sequence together form spaced apart inner edges on the configuration of discrete reflector elements.

18 Claims, 1 Drawing Sheet



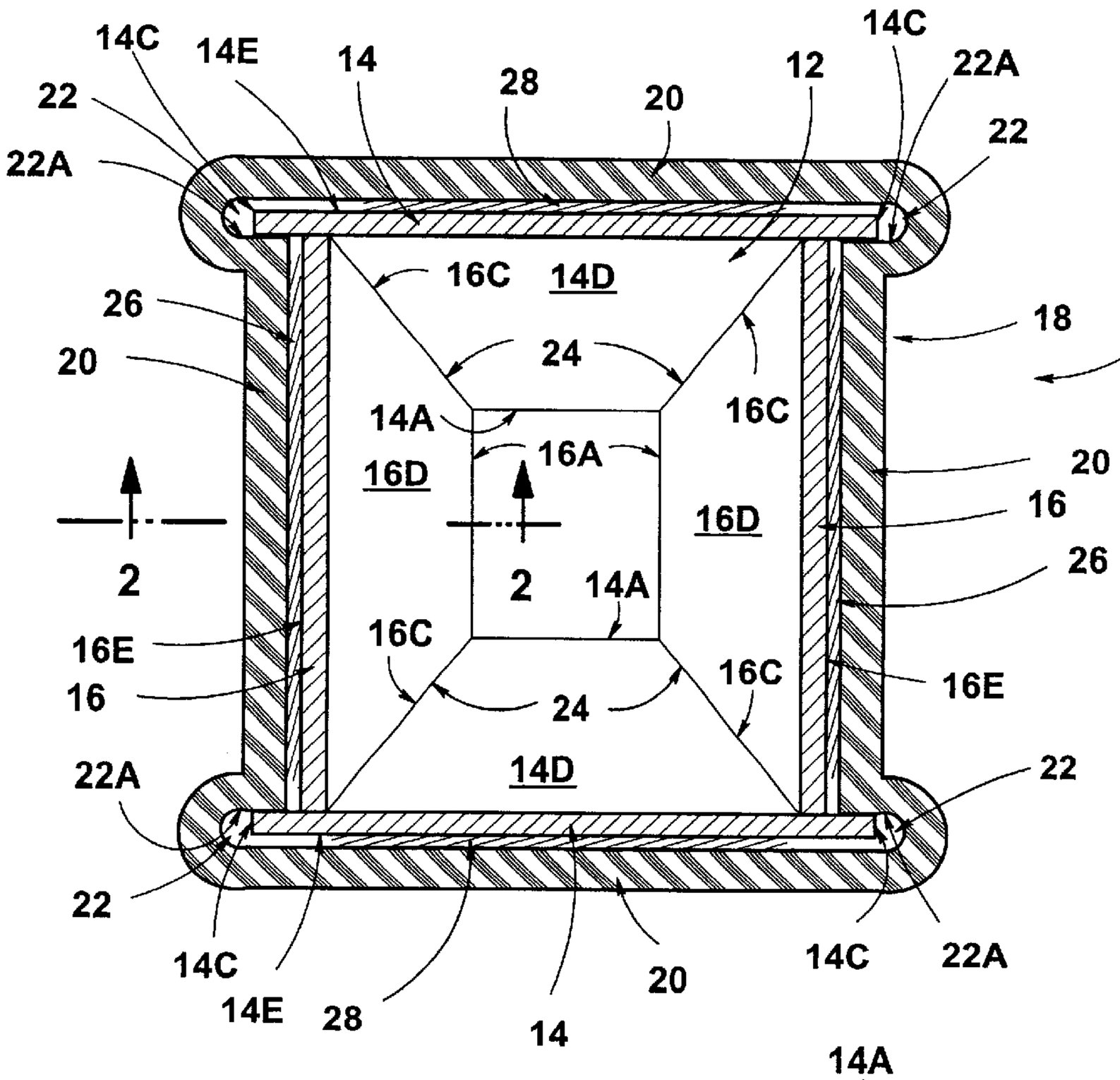


Fig. 1

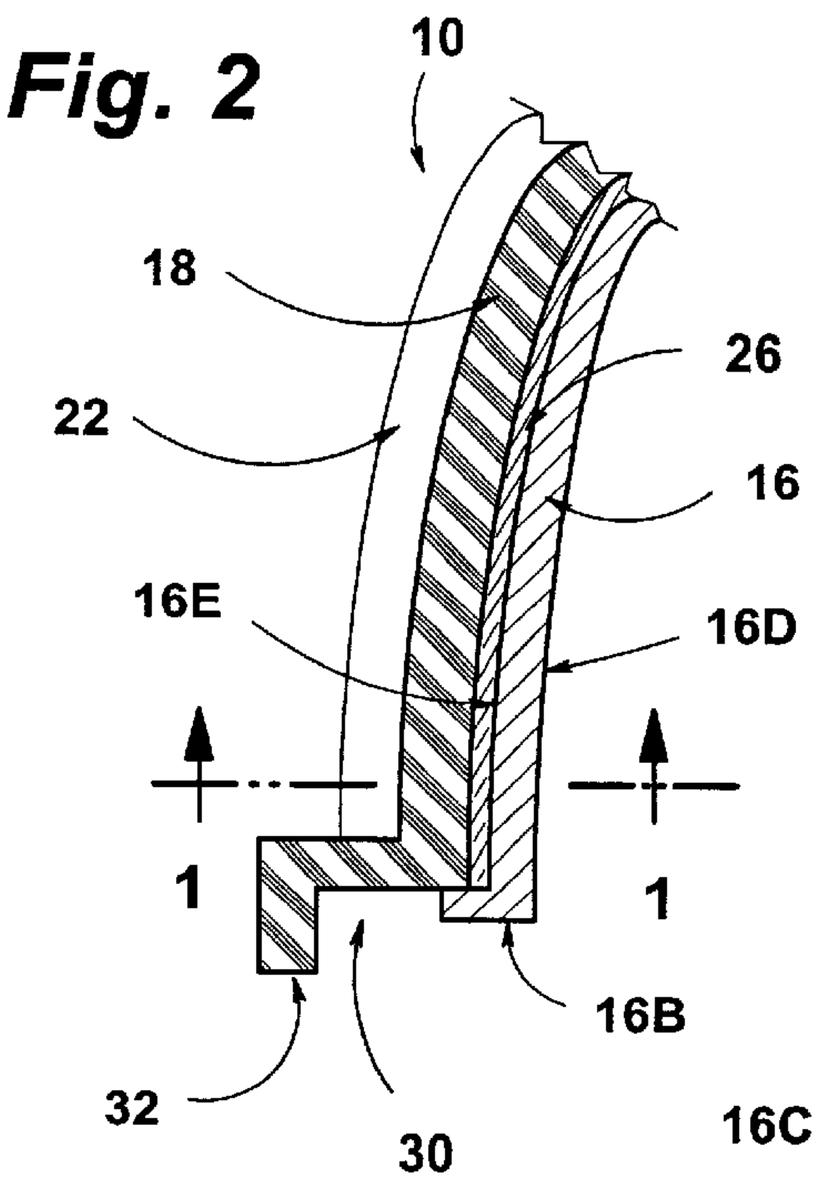


Fig. 2

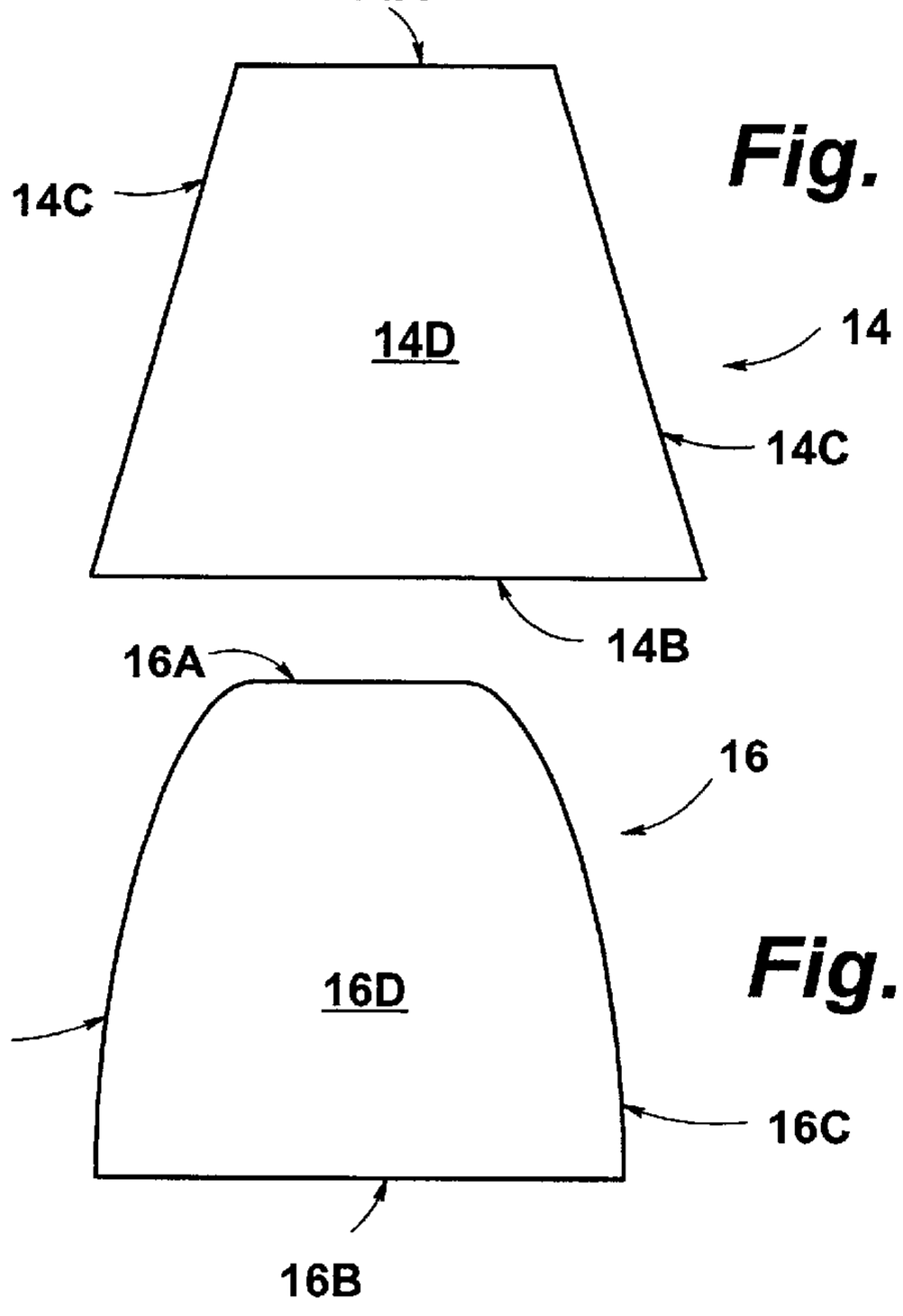


Fig. 3

Fig. 4

POLYGONAL ILLUMINATION REFLECTOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention generally relates to a polygonal reflector for an illumination means, for example an incandescent bulb or the like, and, more particularly, is concerned with a polygonal illumination reflector having a support base and configuration of discrete reflector elements adjoining one another such that opposite side edges of selected ones of the reflector elements are retained in paired facing pockets of the support base.

2. Description of the Prior Art

Polygonal reflectors which can be rectangular, for example, in order to attain specific illumination effects are required by users. Such a polygonal reflector includes a configuration of discrete reflector elements adjoining one another. The reflector elements can be polished, chromium-plated or also superficially satinized metal sheets or also aluminum pieces whose surface is highly polished and subsequently anodized, which are connected one with the other at their edges for forming the reflector. The reflector elements are commonly provided with a given curvature in order to meet the desired requirements of illumination engineering.

The discrete reflector elements of this configuration are also connected to one another by alternately formed-on clips and lead-through openings provided in the regions of opposite side edges of the reflector elements. Two of the reflector elements adjoining one another are fastened one to the other by sliding the clip of the one reflector element into the corresponding opening of the other reflector element and by subsequent bending-over of the clip. However, the bending-over of such fastening clip in order to fasten together the two reflector elements adjoining one another leads to straightening of the given curvature of the reflector element in this region thereof such that this portion of the reflector formed by the reflector elements is noticeable due to a bright luminous corona or similar irregularity which, in turn, is perceived as being disturbing to the user.

Further polygonal reflectors are known, which are produced of one piece by way of a cold-forming process, for example deep drawing. These polygonal reflectors in the boundary region of two adjoining reflector elements form a flute. Even if such a polygonal reflector could be produced wherein the flutes are of small radii, these flutes nevertheless produce light strips when the reflector is being used, which likewise are perceived as unpleasant by the user. The same problem is also encountered in the case of such polygonal reflectors which are produced, for example, of synthetic materials and whose insides are vapor-deposited with a reflecting layer. A further disadvantage here is that the reflection surface cannot be worked subsequently, or only with high expenditure, to generate different properties in terms of illumination engineering.

SUMMARY OF THE INVENTION

The present invention overcomes the aforementioned problems by providing a polygonal illumination reflector that not only meets requirements of users in terms of illumination engineering but also can be produced with simple and inexpensive fabrication techniques.

Accordingly, the present invention is directed to a polygonal illumination reflector which comprises: (a) a configuration of discrete reflector elements having respective pairs of opposite side edges and interior reflective surfaces, the reflector elements adjoining one another in providing the configuration thereof; and (b) a support base supporting the configuration of discrete reflector elements, the base having a plurality of adjacent side portions and a plurality of retaining pockets defined therebetween being arranged in pairs wherein the retaining pockets of each pair open in a facing relationship toward one another so as to receive therein and set in engagement therewith the opposite side edges of the reflector elements in a first sequence in the configuration and the reflector elements in a second sequence in the configuration being disposed between the reflector elements of the first sequence are supported by corresponding ones of the side portions of the base such that the reflective surfaces of the reflector elements of the first sequence and the opposite side edges of the reflector elements of the second sequence together form spaced apart inner edges on the configuration of discrete reflector elements.

More particularly, each of the reflector elements is flexible and its reflective surface faces toward the reflective surface of one other of the reflector elements. The side portions of the base have curvatures which provide the reflector elements and thereby the reflective surfaces thereon with corresponding reflective curvatures. The polygonal reflector also includes means for fastening the reflector elements to corresponding ones of the side portions of the base. The fastening means preferably is an adhesive material that provides an adhesion connection of the reflector elements to the corresponding ones of the side portions of the base.

Additionally, the reflector elements of the first sequence have generally trapezoidal profiles with the opposite side edges of such reflector elements being substantially straight and converging toward one another. The reflector elements of second sequence also have generally trapezoidal profiles but the opposite side edges of such reflector elements are curved and converge toward one another.

These and other features and advantages of the present invention will become apparent to those skilled in the art upon a reading of the following detailed description when taken in conjunction with the drawings wherein there is shown and described an illustrative embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

In the following detailed description, reference will be made to the attached drawings in which:

FIG. **1** is a transverse sectional view a polygonal illumination reflector of the present invention taken along line **1—1** of FIG. **2**.

FIG. **2** a fragmentary longitudinal sectional view of the polygonal reflector taken along line **2—2** of FIG. **1**.

FIG. **3** is a layout view of one of a plurality of reflector elements of the polygonal reflector of FIG. **1**.

FIG. **4** is a layout view of another one of the reflector elements of the polygonal reflector of FIG. **1**.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings and particularly to FIG. **1**, there is illustrated a polygonal illumination reflector of the present invention, generally designated **10**. The polygonal reflector **10** basically includes an arrangement or configuration **12** of discrete reflector elements **14**, **16** and a bearing body or support base **18** supporting the discrete reflector element configuration **12**.

Referring to FIGS. **1**, **3** and **4**, each of the reflector elements **14** and **16** of the polygonal reflector **10** has respective pairs of opposite upper and lower edges **14**A, **14**B and **16**A, **16**B and opposite lateral or side edges **14**C, **16**C. Each of the reflector elements **14**, **16** is flexible and also has an interiorly-disposed reflective surface **14**D, **16**D facing toward the reflective surface **14**D, **16**D of one other of the reflector elements **14**, **16**. For example, the reflector elements **14**, **16** can be pieces of aluminum sheet whose reflective surfaces **14**D, **16**D are highly polished. The reflector elements **14**, **16** adjoin one another such that the opposite side edges **16**C of one of the reflector elements **16** are disposed adjacent to the reflective surfaces **14**D of adjoining ones of the reflector elements **14**.

Referring to FIGS. **1** and **2**, the support base **18** of the polygonal reflector **10** includes a plurality of adjacent side portions **20** and a plurality of retaining pockets **22** defined therebetween and interconnecting the side portions **20**. The side portions **20** and retaining pockets **22** correspond in number to the reflector elements **14**, **16**. Each of the side portions **20** of the support base **18** is substantially coextensive with and disposed adjacent to and outwardly of one of the reflector elements **14**, **16**. The support base **18** has open upper and lower ends. The retaining pockets **22** are arranged in pairs and define grooves **22**A which with respect to each pair of retaining pockets **22** are open and in a facing relationship toward one another. The facing pockets **22** of each pair receive therein and set in engagement therewith the opposite side edges **14**C of the reflector elements **14**. The reflector elements **16** are supported by the corresponding ones of the side portions **20** of the support base **18** such that the reflective surfaces **14**D of the reflector elements **14** and the opposite side edges **16**C of the reflector element **16** together form a plurality of spaced inner edges **24** of the configuration **12** of discrete reflector elements **14**, **16**. The support base **18** of the polygonal reflector **10** also serves as a shape determining base for the reflector elements **14**, **16** in that the side portions **20** of the support base **18** have curvatures which provide the reflector elements **14**, **16** and thereby their reflective surfaces **14**D, **16**D with the desired corresponding reflective curvatures that the reflector **10** is desired to have.

Additionally, as seen in FIGS. **3** and **4**, the reflector elements **14**, **16** have generally trapezoidal profiles with the opposite side edges **14**C of the reflector elements **14** being substantially straight and converging toward one another while the opposite side edges **16**C of the reflector elements **16** are curved and converge toward one another. The configurations of the reflector elements **14**, **16** are such that when the reflector elements **14** are held in the curved configurations by the pockets **22** between the side portions **20** of the support base **18** the straight side edges **14**C of the reflector elements **14** lie along a curve which matches the curvature of the reflector elements **16** held by their corresponding side portions **20** of the support base **18** and their curved side edges **16**C.

The polygonal reflector **10** also includes means that fasten at least each of the reflector elements **16** to corresponding ones of the side portions **20** of the support base **18**. The fastening means preferably is a layer **26** of a suitable adhesive material that provides an adhesion connection of each of the reflector elements **16** at an exterior surface **16**E thereof to the adjacent one of the side portions **20** of the support base **18**. Preferably, but not necessarily, each of the reflector elements **14** at an exterior surface **14**E thereof is also fastened by another layer **28** of adhesive material to the adjacent one of the side portions **20** of the support base **18**.

Such adhesion connections will prevent the reflector elements **14** from slipping or being pulled out relative to the respective pockets **22**. For illustrative purposes only, the layers **26**, **28** of adhesive material depicted in FIGS. **1** and **2** are shown thicker than would be necessary or would be implemented as a rule. The presence of the adhesive material layers **28**, **26** providing the adhesion connections does not change the shaping of the reflector elements **14**, **16** as predetermined by the support base **18**. In this regard, the term adhesion connection or adhesive material refers to all of those connections between the support base **18** and the reflector elements **14**, **16** by which the two joined parts are connected with one another by adhesion and/or cohesion and/or further physical/chemical processes. The support base **18** forms for the reflector elements **14**, **16** a retaining base which is structured corresponding to the intended reflector curvature. The reflector elements **14**, **16** connected through the adhesion connections with the support base **18** consequently have the same curvature as the support base **18** itself.

By way of an example, the polygonal reflector depicted in FIG. **1** is a rectangular reflector whose configuration **12** is built of four reflector elements, namely the two reflector elements **14** and the two reflector elements **16**. The flexibility of the reflector elements **14**, **16** facilitate their insertions into the support base **18** as well as their conformance with the curvature of the support base **18**. The support base **18** is implemented as a housing that completely encompasses the configuration **12**. As mentioned above, the retaining pockets **22** define grooves **22**A and extend in conformance with the curvature of the side portions **20** of the support base **18**. The pairs of retaining pockets **22**, as depicted in FIG. **1**, are disposed between, and at corners formed by, the side portions **20** of the support base **18** such that with respect to each pair of retaining pockets **22** each of the reflector elements **14**, which are provided in a first sequence in the configuration **12** wherein they are alternating with the reflector elements **16** provided in a second sequence in the configuration **12**, is set with its two opposite side edges **14**C engaged in the opposing retaining pockets **22** of one pair thereof and its curvature fixed by the curvature of the retaining pockets **22**. As mentioned above, for additional fixing and binding of the reflector elements **14** to the support base **18**, a layer **28** of adhesive material is introduced between these the exterior surfaces **14**E of the reflector elements **14** and their corresponding side portions **20** of the support base **18**. To complete the configuration **12**, the reflector elements **16** of the second sequence in the configuration **12** are set in the support body **18** after the reflector elements **14** of the first sequence in the configuration **12** are set therein and, if appropriate, are connected with it by means of the aforementioned adhesion connections. In the process of applying the adhesive material, the reflector elements **16** are placed uniformly in contact on the inside of the support base **18** and are held in this position until the adhesion has led to a secure connection of the reflector elements **16** to the support base **18**. The reflector elements **16** adjoin with their lateral or opposite side edges **16**C directly the reflection surfaces **14**D of the reflector elements **14**. Such structuring of the reflector inner edges **24** are thus solely dependent on the dimensional accuracy of the curvature of the opposite side edges of the reflector elements **16**. The reflector inner edges **24** formed in this way meet even high illumination engineering requirements. The opposite side edges of **16**C the reflector elements **16** can be chamfered outwardly for reducing the width of contact of such opposite side edges **16**C with the reflection surfaces **14**E of the reflector elements **14**.

Referring to FIG. **2**, at the lower termination of the configuration **12** the discrete reflector elements **14, 16** can be rounded off at the underside thereof. The support base **18** can also include at the underside thereof a collar **30** which is limited at the margin by a ring **32**. The ring **32** can serve for receiving a lower ring covering as an enclosure.

It is evident in the foregoing description of the present invention that such a polygonal reflector **10** not only meets high illumination engineering requirements but also can be reproduced with simple conventional fabrication techniques. Two adjoining reflector elements **14, 16** structuring each reflector inner edge **24** are not disposed so as to abut at adjacent pair of the side edges thereof such that the structuring of the reflector inner edge does not depend on the dimensional accuracy of two reflector elements but depends only on the tolerance of the one reflector element **16**. The reflector inner edge **24** formed in this way meets high illumination engineering requirements. In addition to the rectangular structuring of such reflector **10** can also be implemented polygonally, for example hexagonally or octagonally. Also, the support base **18** can, for example, be structured as a complete reflector housing or as a reflector frame structured similar to a framework structure, with the latter structure of the support base comprising sufficient contact surfaces in order to bring the reflector elements **14, 16** into the desired shape during their fastening and in order to provide sufficient fastening base.

It is thought that the present invention and its advantages will be understood from the foregoing description and it will be apparent that various changes may be made thereto without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely preferred or exemplary embodiment thereof.

We claim:

1. A polygonal illumination reflector, comprising:

(a) a configuration of discrete reflector elements having respective pairs of opposite side edges and respective interior reflective surfaces, said reflector elements adjoining one another in providing said configuration thereof; and

(b) a support base supporting said configuration of discrete reflector elements, said support base having a plurality of adjacent side portions and a plurality of retaining pockets defined between said adjacent side portions, said retaining pockets being arranged in pairs such that said retaining pockets of each pair open in a facing relationship toward one another so as to receive therein and set in engagement therewith said opposite side edges of said reflector elements in a first sequence in said configuration, said reflector elements in a second sequence in said configuration being disposed between said reflector elements of said first sequence and supported by corresponding ones of said side portions of said support base such that said reflective surfaces of said reflector elements of said first sequence and said opposite side edges of said reflector elements of said second sequence together form spaced apart inner edges on said configuration of discrete reflector elements.

2. The reflector of claim **1** wherein each of said reflector elements is flexible and said reflective surface thereof faces toward said reflective surface of one other of said reflector elements.

3. The reflector of claim **2** wherein said side portions of said base have curvatures which provide said reflector elements and thereby said reflective surfaces thereof with corresponding reflective curvatures.

4. The reflector of claim **1**, further comprising:

means for fastening said reflector elements of said second sequence to corresponding ones of said side portions of said support base.

5. The reflector of claim **4** wherein said fastening means is an adhesive material that provides an adhesion connection of said reflector elements of said second sequence to said corresponding ones of said side portions of said support base.

6. The reflector of claim **1**, further comprising:

means for fastening said reflector elements of said first sequence to corresponding ones of said side portions of said support base.

7. The reflector of claim **6** wherein said fastening means is an adhesive material that provides an adhesion connection of said reflector elements of said first sequence to said corresponding ones of said side portions of said support base.

8. The reflector of claim **1** wherein said reflector elements of said first sequence have generally trapezoidal profiles and said opposite side edges of said reflector elements of said first sequence are substantially straight and converge toward one another.

9. The reflector of claim **1** wherein said reflector elements of said second sequence have generally trapezoidal profiles and said opposite side edges of said reflector elements of said second sequence are curved and converge toward one another.

10. A polygonal illumination reflector, comprising:

(a) a configuration of discrete reflector elements having respective pairs of opposite side edges and respective interior reflective surfaces, said reflector elements adjoining one another in providing said configuration thereof; and

(b) a support base supporting said configuration of discrete reflector elements, said support base having a plurality of adjacent side portions and a plurality of retaining pockets defined between and interconnecting said adjacent side portions to one another, said adjacent side portions corresponding in number to said reflector elements and said retaining pockets being arranged in pairs wherein each of said side portions of said support base is substantially coextensive with and disposed adjacent to one of said reflector elements, said retaining pockets of each pair thereof open in a facing relationship toward one another so as to receive therein and set in engagement therewith said opposite side edges of said reflector elements in a first alternating sequence in said configuration, and said reflector elements in a second alternating sequence in said configuration being disposed between said reflector elements of said first alternating sequence are supported by corresponding ones of said side portions of said support base such that said reflective surfaces of said reflector elements of said first alternating sequence and said opposite side edges of said reflector elements of said second alternating sequence together form spaced apart inner edges on said configuration of discrete reflector elements.

11. The reflector of claim **10** wherein each of said reflector elements is flexible and said reflective surface thereof faces toward said reflective surface of one other of said reflector elements.

12. The reflector of claim **11** wherein said side portions of said base have curvatures which provide said reflector elements and thereby said reflective surfaces thereof with corresponding reflective curvatures.

13. The reflector of claim 10, further comprising:

means for fastening said reflector elements of said second alternating sequence to corresponding ones of said side portions of said support base.

14. The reflector of claim 13 wherein said fastening means is an adhesive material that provides an adhesion connection of said reflector elements of said second alternating sequence to said corresponding ones of said side portions of said support base.

15. The reflector of claim 10, further comprising:

means for fastening said reflector elements of said first alternating sequence to corresponding ones of said side portions of said support base.

16. The reflector of claim 15 wherein said fastening means is an adhesive material that provides an adhesion connection of said reflector elements of said first alternating sequence to said corresponding ones of said side portions of said support base.

17. The reflector of claim 10 wherein said reflector elements of said first alternating sequence have generally trapezoidal profiles and said opposite side edges of said reflector elements of said first sequence are substantially straight and converge toward one another.

18. The reflector of claim 10 wherein said reflector elements of said second alternating sequence have generally trapezoidal profiles and said opposite side edges of said reflector elements of said second alternate sequence are curved and converge toward one another.

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